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EFFECT OF DIFFERENT INTENSITY OF STEP AEROBIC TRAINING ON SELECTED PHYSIOLOGICAL VARIABLES AMONG SCHOOL GIRLS

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Abstract:

The purpose of the study was to find out the effect of different intensity of step aerobic training on selected physiological variables among school girls. For this purpose, sixty (60) girls aged between 15 to 17 were randomly selected from the Kannagi Government Girls Higher Secondary School, Villianur, Puducherry, India as subjects and they were divided into three equal groups of twenty each. Experimental group I (n=20) underwent step aerobics with 4 inches step height, Experimental group II (n=20) underwent step aerobics with 8 inches step height for 5 days per week for 12 weeks, and group III (n=20) acted as control group, they were not allowed to participate in any special training apart from their regular curricular activities. Step aerobics is treated as Independent Variable. Breath holding time and resting pulse rate were selected as physiological variables. Pre test and Post test were conducted on selected dependent variables. Analysis of covariance (ANCOVA) was applied to find out the effect of different intensity of step aerobics training on the selected physiological variables. The Scheffe's post hoc method was used for testing the significance between paired adjusted means. The level of significance was 0.05. The results of the study indicated that the different intensity of step aerobic training had significantly improved the resting pulse rate and breath holding time among School girls.

Key Words: Step Aerobics, Intensity, Physiological Variables & ANCOVA.

Introduction:

Aerobic is the form of physical exercise that combines rhythmic aerobic exercise with stretching and strength training routines with the goal of improving all elements of fitness. It is usually performed to music and may be practiced in a group setting let by a instructor, although it can be done solo and without musical accompaniment. Dr. Kenneth H. cooper was the founder of aerobics. According to Dr. Kenneth H. cooper aerobics is defined as "a method of physical exercise for producing beneficial changes in the respiratory and circulatory systems by activities which require meeting a modest increase of oxygen intake and so can be maintained". Step aerobics is a type of aerobic that involve stepping up on to and down from a portable block. Step aerobics is a form of aerobic power distinguished from other type of aerobic exercise by its use of an elevated platform (the step). The height can be tailored to individual needs inserting risers under the step. Step aerobics is creative, fun, and very challenging. Step routines are performed to music. Patterns of movement stepping on and off the bench can challenge the feet and arms, also. Step aerobics is creative, fun, and very challenging. Step routines are performed to music. Patterns of movement stepping on and off the bench can challenge the feet and arms, also. These movements are more callisthenic in nature. Step routines are usually led by a certified leader at a health club or in an exercise video at home.

Methodology:

Sixty (N=60) girl students studying in the Kannagi Government Girls Higher Secondary School, Villianur, Puducherry, India were selected as subjects at random and they were divided into three equal groups of twenty subjects each namely Experimental group I (Intensity - 4" step height) and Experimental group II (Intensity - 8" step height) and Control group. The age group of the subjects ranged from 15 to 17 years. Breath holding time and resting pulse rate were selected as physiological variables. The training programme included warm-up for 5 to 10 minutes and step aerobic exercise for 30 – 45 minutes and cool down exercise for 3 to 5 minutes. Jumping jack, over the top, across the top, A-step, tap up, basic right, basic left, grapevine, diagonal and V-step are the 4 count step aerobic exercise that are performed by the subjects. . Experimental group I (n=20) underwent step aerobics with 4 inches step height, Experimental group II (n=20) underwent step aerobics with 8 inches step height for 5 days per week for 12 weeks, and group III (n=20) acted as control group, they were not allowed to participate in any special training apart from their regular curricular activities. Pretest and post test was conducted on the selected physiological variable before and after 12 weeks of step aerobics training. Resting pulse rate was measured by the number of palpation was counted for 1 minute. The number of pulse beats per minute was recorded as the score. Breath holding time was measured by the time of holding the breath till the subject let the air out was clocked by using the stopwatch to the nearest $1/10^{th}$ seconds of breath holding.

Statistical Analysis: Analysis for covariance (ANCOVA) statistical techniques was used to test the adjusted post-mean differences among the experimental groups. The Scheffe's post hoc test was used to determine the significance of the paired mean differences.

Analysis of the Data:

Table 1: Computation of Analysis of Covariance on Resting Pulse Rate

(Scores in Beats / minute)

	Exp. Group I (4" Step Height)	Exp. Group II (8" Step Height)	Control Group	Source of Variance	Sum of Squares	df	Mean Squares	'F' Ratio
Pre test	71.10	71.05	71.80	B	7.033	2	3.517	0.95
SD	1.77	1.28	2.53	W	211.95	57	3.718	
Post test	69.55	68.45	72.05	B	136.133	2	68..067	15.22*
SD	2.09	1.99	2.26	W	254.85	57	4.47	
Adjusted Posttest Mean	69.74	68.68	71.63	B	86.314	2	43.157	26.20*
				W	92.237	56	1.647	

(Table value required for significance with degrees of freedom 2& 57, 2& 56 are 3.15 and 3.16) *- Significant

Result of Resting Pulse Rate:

The pre test means of Resting Pulse Rate were 71.10 for experimental group I, 71.05 for experimental group II and 71.80 for control group. As the obtained F ratio 0.95 was lesser than the table F ratio 3.15, at 0.05 level of confidence for degrees of freedom 2 and 57.The post test means of Resting Pulse Rate were 69.55 for experimental group I, 68.45 for experimental group II and 72.05for control group. As the obtained F ratio 15.22 was greater than the table F ratio 3.15, the post test was significant at 0.05 level of confidence for degrees of freedom 2 and 57.The adjusted post test means of Resting Pulse Rate were 69.74 for experimental group I, 68.68 forr experimental group II and 8.91 for control group. As the obtained F ratio 26.20 was greater than the table F ratio 3.16, the post test was significant at 0.05 level of confidence for degrees of freedom 2 and 56.

Table 2: The Scheffe's Test for the Differences between the Adjusted Post Test Paired Means of Resting Pulse Rate

(Scores in Beats / minute)

Adjusted Post Test Means			Mean Difference	Confidence Interval
Exp. Group I	**Exp. Group II**	**Control Group**		
69.74	68.68		1.06*	1.02
69.74		71.63	1.89*	1.02
	68.68	71.63	2.95*	1.02

* Significant

The above table shows the adjusted post test mean differences on Experimental Group I and Experimental Group II, Experimental Group I and Control Group, Experimental Group II and Control Group are 1.06, 1.89 and 2.95 respectively and they are greater than the confidence interval value 1.02 which shows significant differences at 0.05 level of confidence. However, the decrease in Resting Pulse Rate is significant for Experimental Group II than Experimental Group I and Control Group. It may be concluded that the Experimental Group II has established better than the Experimental Group I in reducing Resting Pulse Rate.

Discussion on the Findings on Resting Pulse Rate:

Shaver (1982) stated that due to endurance training, the thickness of the ventricular wall remains normal, the size (volume) of the ventricular cavity of the heart becomes large which means that it is able to hold more blood during the resting or diastolic period. As training progress, this results not only in a slower heart rate for a standard sub maximal work load, but also in a slower resting pulse rate and slight decrease in maximal heart rate. The increased size of the heart causes stroke volume and cardiac output to be increased. This greater efficiency of the heart allows a large blood flow to reach the muscles with less stress imposed on the heart, lungs and vascular systems. It is obvious that the trained person is able to accomplish his or her cardiac output at a much lower heart rate. Sankar and Gopinath (2010) studied the effect of different intensities of aerobic training on resting pulse rate for 12 weeks. The results of the study showed that there was a significant reduction on resting pulse rate due to high intensity aerobic training.

Breath Holding Time:

Table 3: Computation of Analysis of Covariance on Breath Holding Time

(Scores in Seconds)

	Exp. Group I (4" Step Height)	Exp. Group II (8" Step Height)	Control Group	Source of Variance	Sum of Squares	df	Mean Squares	'F' Ratio
Pre test	28.10	27.55	28.05	B	3.70	2	1.850	0.76
SD	1.68	1.36	1.64	W	139.70	57	2.451	
Post test	30.15	31.55	27.80	B	143.63	2	71.82	19.62*
SD	1.84	2.14	1.74	W	208.70	57	3.66	
Adjusted Post test Mean	29.99	31.82	27.68	B	169.147	2	84.57	37.76*
				W	125.44	56	2.240	

Table value required for significance with degrees of freedom 2& 57, 2& 56 are 3.15 and 3.16)

* Significant

Result of Breath Holding Time:

The pre test means of Breath holding time were 28.10 for experimental group I, 27.55 for experimental group II and 28.05 for control group. As the obtained F ratio 0.76 was lesser than the table F ratio 3.15, at 0.05 level of confidence for degrees of freedom 2 and 57.The post test means of Breath holding time were 30.15 for experimental group I, 31.55 for experimental group II and 27.80 for control group. As the obtained F ratio 19.62 was greater than the table F ratio 3.15, the post test was significant at 0.05 level of confidence for degrees of freedom 2 and 57. The adjusted post test means of Breath holding time e were 29.99 for experimental group I, 31.82 for experimental group II and 27.68 for control group. As the obtained F ratio 37.76 was greater than the table F ratio 3.16, the post test was significant at 0.05 level of confidence for degrees of freedom 2 and 56.

Table 4: The Scheffe's Test for the Differences between the Adjusted Post Test Paired Means of Breath Holding Time

(Scores in Seconds)

Adjusted Post Test Means			Mean Difference	Confidence Interval
Exp. Group I	Exp. Group II	Control Group		
29.99	31.82		1.83*	1.19
29.99		27.68	2.31*	1.19
	31.82	27.68	4.14*	1.19

* Significant

The above table shows the adjusted post test mean differences on Experimental Group I and Experimental Group II, Experimental Group I and Control Group, Experimental Group II and Control Group are 1.83. 2.31 and 4.14 respectively and they are greater than the confidence interval value 1.19 which shows significant differences at 0.05 level of confidence. However, the improvement in Breath Holding Time significantly higher for Experimental Group II than Experimental Group I and Control Group. It may be concluded that the Experimental Group II has established better than the Experimental Group I in improving Breath Holding Time.

Discussion on the Findings of Breath Holding Time:

Bhagavad Geetha et. al.,(2014) states that during voluntary breath holding, tissues continue to utilize oxygen and liberate carbon di oxide. Therefore during breath holding, arterial pO_2 falls and pCO_2 rises. The point at which breathing can no longer be voluntarily inhibited is called the breaking point. The breaking point is generally reached when alveolar pO_2 is 56 mm of Hg and alveolar pCO2 is 49 mm of Hg. Either an increase in pCO_2 or a decrease in pO2 stimulus central and peripheral chemoreceptor which in turn stimulate respiration through respiratory centers, thus influencing breath holding time. Breath holding time depends on mechanical factors like pCO_2, pO_2 and H^+ ion concentration, nonchemical factors like involuntary muscular contractions, psychological factors like motivation, stress, competition, extrinsic factors like training and muscular exercise. Daljeeth Singh and Monika Verma (2014) conducted a study to find the effect of aerobic exercise on physiological variables for 15 weeks. The result of the study showed that aerobic exercise helps in reducing body weight, blood pressure and enhancing the breath holding capacity of rural sportsmen.

Conclusion:

- ✓ In Resting pulse rate, the Experimental group II (Intensity – 8" step height) exhibited significantly reduction than Experimental group I (Intensity – 4" step height). Hence Experimental group II was significantly better than Experimental group I.
- ✓ In Breath holding time, the Experimental group II (Intensity – 8" step height) exhibited significantly greater improvement than Experimental group I (Intensity – 4" step height). Hence Experimental group II was significantly better than Experimental group I.

Recommendations

- ✓ Step aerobics will be suggested to improve physicological varialbles.
- ✓ High intensity of step aerobics will be practiced to find better effect in the development of motor fitness and physicalogical variables.
- ✓ Step aerobics will be recommended to include in the school physical education curriculum to improve over all development of the children.

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